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## PART I

### IRRIGATION SYSTEMS MANAGEMENT RESEARCH PROJECT

#### INTRODUCTION

This sixth quarterly activities report covers the period from December 1992 to February 1993. During this period IIMI further intensified its provision of technical assistance to collaborating institutions in data collection and analyses, and in writing quality symposium papers and reports on the different studies. IIMI organized and held the Second Biannual ISM/R Progress Review Meeting at the Avari Hotel in Lahore on 25 January 1993. Important details on the preparation of the 11-13 April ISM/R Symposium were also discussed during the meeting. A revised Symposium program was distributed and an absolute deadline set for submission of drafts of papers.

During the period under review, two physical hydraulic modeling studies were started by the Directorate of Hydrology and Research in the Sindh. Five officers from the same Directorate completed their training in hydraulic monitoring, physical hydraulic modeling, and water quality testing in Lahore. Assistance was provided to NARC in implementing a two-week **course** on sprinkler and trickle irrigation *for* forty participants on 9-21 January 1993, and in formulating and arranging a one-week course on surface irrigation for forty to fifty officials and farmers to be held at NARC, Islamabad on 17-22 April 1993.

#### PROGRESS OF ACTIVITIES

As in previous reports, this report features a chronology of interaction visits and meetings, including significant events in implementing the various activities of the ISM/R component of the CA as shown in Attachment A.

The Second Biannual ISM/R Progress Review Meeting was held on 25 January 1993 from 9:00 A.M. to 4:00 P.M. at the Avari Hotel in Lahore. The chairman of the meeting was Dr. E. J. Vander Velde (EJV), Acting Director of IIMI-Pakistan after Dr. J. W. Kijne was appointed Director of Research of IIMI in Colombo. EJV introduced Mr. Javed Saleem Qamar, General Manager (Planning) WAPDA, who also chairs the Cooperative Agreement Planning and Review Committee, and Mr. Jan P. Emmert, Chief of the Water Resources Division of USAID. EJV also welcomed the 50 participants..

Fifteen to twenty minutes were allotted for **each** subproject. This included an overview by the subproject leader and individual presentations by the principal investigators and senior and junior research officers. For each study, a brief

statement was given on the objectives, findings, conclusions, current status of data collection **and** analysis, paper and report writing, and future plans. The presenters were requested to focus on what **had** been accomplished since the First Biannual Meeting **held on** 24 September 1993.

As in the first meeting, the **order** of presentation was as follows:

Integrated watercourse management }

Farm water management

Beyond watercourse improvement

Irrigation systems outside the Indus Basin

Development of ground and surface water models

Public and private tubewell performance

Improving efficiency of on-farm water use and application

Encouraging water users associations

Surface drainage and water table control **program**

Research studies related **to** the upgradation of the Hydraulics and Soil Mechanics Laboratories in Hyderabad and Karachi.

Messrs. Abdullah Khan and Waryam Ali Mohsin gave an overview of the status and plans for each of the subprojects on the first two subprojects on "Integrated water course management" and "Farm water management" which are being done in Mona **and** LIM, respectively. They then asked their respective staff to present the individual studies: Messrs, Ghulam Mohy-ud-Din, Zahir Piracha, and Abdul Ghaffar for Mona; and Messrs. Mumtaz Ali Buriro and Abdul Hameed for LIM.

While acknowledging the inclusion of economic analysis in evaluating the technologies being generated in **some** of the studies at Mona, Mr. Jan Ernmert raised the management issue of the organizational and institutional arrangements needed to **move** potentially useful findings to practical applications by end users. Mr. Khan stated that Mona has been trying to address this issue by including in its activities a plan for his staff to conduct research beyond the Mona Project **area**.

Mr. Bashir Ahmad, WCMED Project Director, reported on the lone study under the subproject on "Beyond watercourse improvements." When he finished, Prof. Arshad

Ali and Dr. Shahid Ahmad suggested that it would be desirable to compare the findings of similar work done elsewhere in the past.

Mr. Khalid Javed Upal, PD(S) Acting Project Director, introduced Messrs. Mushtaq Ahmed, Mohammed Khalil and Riaz Ahmad to report on the subproject on "Irrigation systems outside the Indus basin." While commending the impact of the improvements done on the karezes, Dr. Bashir Chandio questioned the economic viability of the recommended development measures to rehabilitate karezes in the face of an observed decreasing karez area and increasing drilled and dug wells. The Chair expressed the view that the forthcoming April symposium would be the more appropriate time and venue for a thorough discussion of these questions. On a query about the fate of two studies on the "Installation of low head bubbler in Mastung area" and the "Experimental improvement of one irrigation scheme in the Northern area" which were not reported but were listed as activities of the new PIL of WAPDA, Mr. Ahmed replied that the studies will be carried out.

Mr. Muhammad Munir, Chief Engineer of P&I WAPDA, summed up the work being conducted by the WAPDA institutions under his office. He expressed satisfaction with the useful findings coming out of the studies, especially from Mona and PD(S), and that 33 technical reports and 14 Symposium papers are expected to be prepared and completed.

For the subprojects on "Developments of ground and surface models" and "Public and private tubewell performance," Mr. Yaqoob Khan, SMO Chief Engineer, called on Messrs. Javed Zaman, Farhat Zaman, Imtiaz Ali, Parvez Arif and Mohammad Memon to present their respective studies.

Dr. Shahid Ahmad, Director of the WRRI, NARC, started with a discussion of the continuum of technology generation to adoption by various end users in introducing the different studies under the subproject on "Improving efficiency of on-farm water use and application." In the trickle and sprinkler irrigation studies, he emphasized the aspect of indigenization in the manufacture of the components needed for systems installation. He requested Prof. Arshad Ali to report on the border irrigation study being conducted by a number of principal investigators in various parts of the country.

Dr. Bashir Chandio, PCRWR Chairman, gave an overview of the subprojects on "Encouraging water users associations" and the "Surface drainage and water table control program." He reported on the activities going on in the Qadirabad and Drush Khela areas, the two sites of the first subproject. For the second subproject, Mr. Muhammad Khan Marri of DRIP discussed the various pilot tile drainage units being monitored including the ones currently being installed. He also mentioned some problems connected with the tile drainage laying machine being used in the Jacobabad site.

Mr. Shamim-ud-din Ahmed, Deputy Director, Directorate of Hydrology of the SID in Hyderabad, presented the physical hydraulic modeling studies recently started on sediment **excluders/ejectors** and the effect of downstream glacis slope on scour. He showed some slide pictures of the modeling setups.

The Chair requested SMM to lead the review on the preparations for the ISM/R Symposium. The group went over the tentative program on such items as the venue, dates, timing, titles of papers, authors, etc., and the list of participants. Any change in title/author(s), deletion/addition of papers was requested to **be** submitted **or** communicated before participants left the meeting venue. It was also agreed to hold a technical session on "Irrigation Management Research Agenda of Pakistan for the Future" to precede the closing session. Paper presenters would include Dr. Bashir Chandio who would present the view from PCRWR; from WAPDA, Mr. Muhammad Munir; from PARC, Dr. Shahid Ahmad; and from IIMI for the global view, Dr. Jacob Kijne. (The revised symposium program incorporating the suggested changes is shown in Attachment B).

The absolute deadline *for* receipt of the final **drafts** of papers by IIMI was set on 14 February 1993 *so* that the papers could be edited, printed and bound to *be* ready for distribution before the symposium **date**. The Chair strongly supported the deadline set.

Mr. Emmert, who was leaving Pakistan soon for a new assignment, introduced Mr. Muzammil Hussain Qureshi, currently Chief Engineering Advisor, who will take **over** Mr. Emmert's job as Chief of the Water Resources Division in a concurrent capacity.

Other activities during the period under review included a meeting between IIMI staff (SMM and BAS) and Mr. Shamim-ud-din Ahmed of the Directorate of Hydrology and Research in the Sindh. They reviewed **the** good progress being made on the physical modeling of sediment ejectors for the Jamrao canal and the effect of downstream **glacis slope** on scour. The study on hydrological data and monitoring of irrigation water in the Sindh province is still awaiting the return of staff being trained with ACOP-WAPDA and the delivery of research equipment still being procured. IIMI staff (BAS) arranged with the Irrigation Research Institute, Lahore the training of two Directorate officers on hydraulic modeling; with ACOP-WAPDA the training of two officials on hydraulic monitoring; and with the Land Reclamation Directorate, Punjab, the training of one official on water quality testing. All **five** officers received their **certi-ficates** of completion on 14 February 1993 at the ACOP-WAPDA office.

A **2-week** training on the design and operation of sprinkler and trickle irrigation was held on 8 to 21 January 1993 at the NARC Training Institute **in** Islamabad in which SMM, MAB, and MK participated as resource persons for IIMI. Participation was not restricted to ISM/R collaborators only. The forty participants came from various agencies which are currently engaged in sprinkler and trickle research and development such as the **OFWM** project, university and NGO staff, **and** some farmers.

MA6 also provided assistance in developing an expanded version of the **on-job** training course on surface irrigation held at the University of Agriculture, Faisalabad, in June, 1992. The one-week course is being organized for 40 to 50 participants to meet the greater demand and benefit a wider audience. **The course** is scheduled to be held at the NARC training facilities on 17-22 April 1993.

As stated earlier, the significant interactions between IIMI staff and research staff of collaborating Pakistani institutions during the sixth quarter were mostly on *the* preparation of draft ISM/R Symposium papers and final reports. The interactions consisted mainly of reviewing format, content, outline, initial draft, advanced **draft** and final version of **papers** preliminary to printing.

**In** the case of Mona, SMM, MK, MAB and EVW had several discussions with Messrs. Ghulam Mohy-ud-Din, Mohammad Iqbal, Saddique **Rafiq** and Zahir **Ahmad** Piracha on their draft papers. Dr. Ramzan Chaudhry of IWASRI was invited to join the discussion on the three studies under the subproject on "Farm Water Management." With LIM, MK met with Mr. Abdul Hameed, and SMM and PS with Mr. Mumtaz Ali Buriro on their draft papers.

On 1 February 1993, the contract for printing **80** copies of the report on the "Plan and Rehabilitation **and** Improvement of Karezes in Balochistan" was awarded by IIMI in the presence of CGR and Mr. Mushtaq Ahmed of PD (S). On the draft papers prepared by Messrs. Ijaz Humayun, Mushtaq Ahmed, Muhammad Khalil and Riaz Ahmad, CGR and MK had several **sessions** with the second author, and **PS** and **MAB** with the last two authors, respectively.

Some of interactions of EJV and **MB** with SMO involved the organization of **an** Experts Meeting to advise on data analysis in establishing the possible causes of tubewell deterioration. ZH provided assistance in installing softwares on graphics and training on computer virus checking and cleaning to SMO computer users. As in the previous quarter, weekly sessions (4-6 hours **each**) were held between MN **and** the **SMO** staff engaged in the groundwater modeling work. The preparation of papers for the April Symposium continues to be a major part of the interaction. **MB** had several intensive sessions with Messrs. Moharnmad Memon and Parvez Arif; **MN** with Messrs. Javed Zaman, Farhat Zaman and Imtiaz Ali.

In January, DTB met with Dr. Munir Bhatti at the IIMI-Pakistan Office, **Lahore**, to work together **on** the paper on the Qadirabad pre-project socio-economic study, and to review the draft on the synthesis study. Further discussions on the **same** papers **were** held with Dr. Chandio during the ISM/R Biannual Meeting. SMM discussed with Dr. Chandio the desirability of preparing a symposium paper on **the** "Boundary Effects on Seepage Interception Using **the** Galerkin Finite Element Model."

By the end of February, IIMI received the following Symposium papers:

- \* Lessons Learned on Mechanized Construction and Maintenance of Earthen Watercourse
- \* Buried Pipeline Irrigation System **and** Its Impact on the Farm Economy
- \* **Procedure** for Adjusting Cropping Pattern to Irrigation Supplies
- \* Manually **Installed** Tile Drainage System - Its Effect and Economics
- \* Water Management Strategies under Shallow Water Table Conditions (Mona and LIM)
- \* **Use** of Brackish Groundwater for Crop Production
- \* Augmentation/Conjunctive Use of Surface and Groundwater **Through** Fractional Wells
- \* Flow Variations in Distributaries and Reachwise Supply to Outlets
- \* Effect of Karez Improvements, Rehabilitation and Future Development Plan in Balochistan
- \* Advanced Irrigation Techniques and Their **Use** in Balochistan
- \* **Delay** Action Darns in Ziarat **Valley** - An Estimation of Economic Impact
- \* Effect of Brackish Water and Phosphorus on Yield of Onion
- \* Estimation of Hydrologic Parameters for Regional Groundwater Models
- \* An Appraisal of Groundwater Pollution in Allahabad Unit, SCARP-VI
- \* Interaction of Saline **and** Fresh Water Zones in Allahabad Unit, SCARP-VI
- \* Groundwater Quality **Changes in** Allahabad Unit, SCARP-VI
- \* Classification of SCARP Tubewells in the Data Base by Their Characteristics and Performance Record
- \* Level Borders Irrigation Application Efficiency Under Different Soil Surface Conditions
- \* Level Border Irrigation Layout and Evaluation in Pakistan
- \* Innovative Surface Irrigation Methods for Orchards

- \* Benefits **of** Supplemental Irrigation for Wheat in Barani Environment
- \* Design **and** Local Manufacturing **of** Raingun Sprinkler Irrigation **Systems**
- \* **Indigenization of** Trickle Irrigation Technology
- \* Potential **Role of** Water Users Associations for Better Water Management at the Farm Level: Synthesis of Nine Studies

In **late** February, USAID updated IIMI on the progress being made on the procurement **of** research equipment for the components of **PARC** and the Directorate of Hydrology **and Research** in Sindh, The information was relayed **to** the **two** organizations.

## PROBLEMS

**As reported in the** last quarterly activities report, the much delayed procurement of research equipment **by** the Commodities Division of **USAID** for **PARC** and the Directorate of **Hydrology** and Research in Sindh **has adversely affected** the implementation of some **projected** studies, The funding arrangements for the three studies **being** conducted **by** the Directorate of Hydrology and Research in the Sindh continue **to be** unclear **due to** not **knowing** the exact amount that could be **made available as savings** from the purchase of **research** equipment.

## FUTURE PLANS

For the seventh quarter **of** the Project (March to May 1993), IIMI will further intensify **its** provision of technical assistance to collaborating institutions in the writing of quality technical reports and Symposium **papers** for **the** different studies. **The** organization and detailed preparations for the 11-13 April 1993 ISM/R Symposium to **be** held at the Punjab Engineering **Academy** in Niat **Beg**, Lahore will **be** a major preoccupation. **As** agreed with PARC, IIMI will provide assistance in jointly organizing and offering an **expanded** one-week training course on surface irrigation to **be held** on 17-21 April 1993 at **NARC**, Islamabad. The preparation of a final **report of** all activities under the ISM/R Project **and** submission of **the** same to the **USAID will be** the culminating activity.

The advisability **of** holding a final meeting of *the* **CA** Planning and Review Committee before the Project's completion at the end of **May** 1993 will **be** discussed with **the** Chairman.



## Attachment A

### **CHRONOLOGY ~~OF~~ INTERACTION VISITS AND MEETINGS IN IMPLEMENTING THE ISM/R COMPONENT OF THE CA**

Date	Description of Interaction
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#### **ALL INSTITUTIONS**

25 January	Participation of all IIMI staff providing technical assistance to the ISM/R Project in the Second Biannual Progress Review Meeting held at the Avari Hotel in Lahore. Likewise, <b>USAID and</b> all the collaborating institutions in the ISM/R Project were represented. The meeting was <b>chaired</b> by EJY, Acting Director, IIMI-Pakistan.
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A brief overview, presentation **and** discussion of **each** subproject and study began promptly at **9:00 A.M.** Those making the presentation were **requested** to focus on what was accomplished since the First Biannual Meeting held on 24 September 1992.

**A discussion** followed, **led** by SMM, on the preparations for the **11-13 April 1993 Symposium** to be held at **the Punjab Engineering Academy** at Niaz Beg, Lahore.

3 February	Distribution of Highlights of the Second ISM/R Biannual Meeting to participants.
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<b>17 February</b>	Meeting of SMM <b>and</b> BAS with Mr. Tahir Malik, Principal, Punjab Engineering Academy, and his concerned staff <b>to</b> finalize arrangements for the ISM/R Symposium <b>on 11-13 April 1993.</b>
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21 February	Submission by SMM to USAID of the 5th Quarterly Activities Report on the ISM/R.
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#### **Mona Project**

Early December	Review by EVW of draft report on the study "Matching of Cropping Pattern with Water Supply," His comments and suggestions were mailed to Mr. Ghulam Mohy-ud-Din.
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- 25 January Receipt by EVW of revised draft **of** paper prepared by Mr. Mohy-ud-Din on "Procedure for Adjusting Cropping Pattern **to** Irrigation Supplies" in which he **had** incorporated mast of EVW's comments and suggestions.
- 26 January Meeting of EVW with Mr. Mohy-ud-Din on some minor editing on the draft **paper**, MAB reviewed with Mr. Mohy-ud-Din the draft paper on "Lessons Learned on Mechanized Construction and Maintenance of Earthen Watercourse."
- 26-27 January Detailed discussions of MK with Messrs. Mohammad Iqbal and Saddique Rafiq of Mona and Dr. Ramzan Chaudhry of IWASRI on three studies being undertaken by Mona: "Water Management Strategies under Shallow Water Table Conditions," "Salt Balance at Rootzone," and "Effect of Brackish Water **on** Crop Production."
- 17 February Receipt through Mr. Afzal Javaid, Deputy Director, **P&I**, WAPDA, of the following ISM/R symposium papers submitted by Mona Project staff:
- \* Lessons Learned on Mechanized Construction and Maintenance of Earthen Watercourse
  - \* Buried Pipeline Irrigation System and Its **Impact** on the Farm Economy
  - \* Procedure for Adjusting Cropping Pattern **to** Irrigation Supplies
  - \* Manually Installed Tile Drainage System - **Its** Effect **and** Economics

The symposium papers were distributed for final review to corresponding IIMI staff providing technical assistance.

## **LIM**

- 26 December Meeting of **MK** with Mr. Waryam Ali Mohsin at the **IIMI-Pakistan** office about three draft Symposium papers.
- 14 January Visit of **SMM** to the LIM campus in Hyderabad to review with Messrs. Ali Mohsin, Mumtaz Ali Buriro and Abdul Hameed the progress on revising the three draft papers.

- 24 January Meeting of MK with Messrs. Ali Mohsin and Hameed on two studies: "Water Management Strategies for Areas with **Poor** Drainage or Shallow Water Table Conditions" and "**Use** of Brackish Groundwater for **Crop** Production;" and SMM with Mr. Ali Buriro on "**Augmentation/Conjunctive Use** of Surface and Groundwater Through Fractional Skimming **Wells**."
- 16 February Submission to MK of two Symposium papers by Mr. Abdul Hameed for final review prior to printing.
- 22 February **Request** of SMM to PS to travel to the LIM Campus in Hyderabad to work with Mr. Ali Buriro in strengthening the economic analysis and write up of the latter's Symposium paper.

### **WM&ED**

- Dec-Jan Meetings of MA8 with WM & E staff to review the progress made on the data analysis and interpretation of **results**, writing of report and preparation of draft of Symposium paper in the study on "Existing Flows in Watercourses as Compared to Design **Discharges**."
- 17 February Receipt by SMM of **draft** Symposium Paper on "Flow Variations in Distributaries and Reachwise Supply to **Outlets**." References on similar studies were discussed by SMM with Mr. Bashir Ahmad. It was suggested to **add** another table on the performance of different types of outlets.

### **PD(South)**

- 15 December **Meeting of** CGR with PD(S) staff on the procedures to be followed in the printing of the Karez Report for the Government of Balochistan.
- 6 January Meeting of **CGR and MAB** with Mr. Riaz Ahmad to discuss the **draft** paper on "Effect of Brackish Water and Phosphorus on Yield of Onion,"
- 25 January Brief discussions of CGR with PD(S) staff while attending the 2nd ISM/R Biannual Meeting at the Avari Hotel in Lahore.
- 28 January **Participation of** CGR and SMM with Mr. Ahmed of the PD(S) and IIMI support staff in finalizing the award of the **contract** for printing the Karez Report.

- 1 February Meeting of CGR with **Mr. Ahmed** to **discuss** in **detail** the **former's** comments **and** suggested changes on the paper "Effect of Karez Improvement and Future Plan for Improvement in Balochistan."
- 18 February Receipt by SMM from Mr. Ahmed the following draft **Symposium papers** for review and editing of IIMI TA team (CGR, **MK, PS, MAB**) prior to printing:
- \* Effect of Karez Improvements, Rehabilitation **and** Future Development Plan in **Balochistan**
  - \* **Advanced** Irrigation Techniques and **Their** Use in **Balochistan**
  - \* Delay **Action Dams** in **Ziarat Valley** - An Estimation **of** Economic Impact
  - \* Effect of Brackish Water **and** **Phosphorus** on Yield **of** Onion
- 20 February **Meeting of PS** with Mr. Muhammad Khalil from PD(S) to review **the paper** on "Delay **Action Dams**." Comments and suggested final outline were given to Mr. Khalil.
- 23 February Meeting of MK with Mr. Ahmed on the draft **Symposium paper** on "**Advanced** Irrigation Application **Methods and Their Use** in Balochistan."
- 28 February Submission by CGR for presentation in **the** Symposium **of** final **draft** of paper on "Effect of Karez Improvements, Rehabilitation **and** Future Development Plan in Balochistan."

## **SMO**

- 5 December Meeting of MB with Mr. Mian **Saeed** Hussain at the **IIMI-Pakistan office** for the organization **of** an Experts **Meeting to be organized by IWASRI**.
- 6 December Visit **of** MB to SMO to **advise** Mr. **Muhammad** Memon on the approach to **be** followed if **work** relating to **bio-fouling as** a cause of tubewell deterioration **was to be taken up**. Work in **hand** by Mr. **Parvez** Arif on data analysis was reviewed.
- 14 December Participation of EJV and **MB** in the **well-attended** Experts Meeting at **IWASRI** to **advise** on **data analysis** to establish possible **causes'of** tubewell deterioration.

22 December	Visit of MB to SMO to review with Mr. Memon <b>the</b> draft report on tubewell rehabilitation work. Guidelines for the report <b>and</b> also for the Symposium paper were given to Mr. Memon.
3 January	Assistance provided by MB to Mr. Parvez Arif who dropped by the IIMI-Pakistan Office to <b>get access to a Graphics Computer</b> Program for the <b>work</b> he was doing.
4 January	Visit of ZH to SMO to assist Mr. Arif in installing two <b>software</b> packages, HARVARD <b>GRAPHICS</b> AND F-PORT (a virus scanner and <b>cleaner</b> ), in SMO <b>computers</b> .
5 January	Visit of MB and ZH to SMO. ZH assisted Mr. Arif in tackling the virus problem in computers. ZH also provided <b>short</b> training to <b>SMO computer users</b> on virus checking and cleaning. MB discussed <b>with</b> Mr. <b>Yaqoob</b> Khan, SMO Chief Engineer, the issues involved in taking up additional work on tubewell rehabilitation. <b>Mr.</b> Khan indicated <b>that</b> he would raise the matter during a meeting with <b>USAID</b> the next day.
6 January	Meeting of EJV and MB at the IIMI-Pakistan office with <b>Mr.</b> Jan Emmert of <b>USAID</b> to discuss matters pertaining <b>to</b> SMO work.
7 January	Meeting of MB with Mr. F. <b>M.</b> Nasir of IWASRI on the minutes of the 14 December Experts Meeting at IWASRI.
18 January	Provision by ZH to Mr. Arif of a few files of <b>the software</b> packages given earlier which were damaged by computer viruses and not working properly. .
23 January	Meeting <b>of MB</b> with Messrs. Memon and Arif to review <b>the format</b> and content of the Symposium papers.
4 February	Review by MB of first <b>drafts</b> of Symposium <b>papers</b> prepared <b>by SMO</b> staff.
7 February	Decision by <b>MB</b> in consultation with EJV to advise Mr. Arif to change the subject of the latter's paper on <b>database</b> with a revised classification of data.
9 February	Meeting of <b>MB</b> with Mr. <b>Arif</b> to review the outline of <b>Mr. Arif's</b> paper.

- 17 February      **Receipt** by SMM from MN the following **drafts** of Symposium papers for review and editing prior to printing:
- \*      Estimation of Hydrologic Parameters for Regional Groundwater Models
  - \*      **An** Appraisal of Groundwater Pollution in Allahabad Unit, SCARP-VI
  - \*      Interaction of Saline and Fresh Water **Zones** in Allahabad Unit, SCARP-VI
  - \*      Groundwater Quality Changes in Allahabad Unit, SCARP-VI
- 18 February      Lengthy session of MB with Mr. Muhammad Memon regarding Mr. Memon's Symposium paper which involved a restructuring **of the** original paper.
- 22 February      Meeting of MB with Mr. Arif to review the latter's drafts.
- Dec-Feb          **Weekly** sessions (4-6 hours each beginning this period) **by** MN with Messrs. Javed Zaman, Farhat Zaman and Imtiaz Ali on the subproject on "Development of groundwater models." Advice has **been** provided on the use of the database prepared by SMO. **The** preparation of papers for the **April** Symposium has been a major part of the interaction.

## **PARC**

- 9 January          Participation *of* SMM and MAB in the opening ceremony of the two-week on-job training course on sprinkler and trickle irrigation systems held at the NARC Training Institute in Islamabad. SMM gave a presentation on IIMI and its role in the ISM/R; **MAB** lectured on soil-plant-water **relationship**.
- 10 January          Meeting **of** SMM with Dr. Shahid Ahmad about budget matters **and** the latest report on the procurement of research equipment **by the** Commodities Division of USAID
- 12-14 January      Participation *of* MK in the training course on sprinkler and trickle irrigation systems,
- 21 January          Attendance of SMM and MAB in the closing ceremony *of* the course on sprinkler and trickle irrigation Systems.

- February Meetings of **MAB** with Dr. Ahmad, Director, **WRRRI**, **NARC**, and his Deputy Director, **Mr. M. Yasin**, on the detailed **program** and organization of the one-week on-job training course on **surface** irrigation systems to **be** held at **the** **NARC** Training Institute on **17-22** April 1993. **The** course is an expanded version of the on-job training held at the University of Agriculture, **Faisalabad**, in June, 1992, which is intended to benefit a **much wider** participation. About **40** to 50 participants are expected.
- 17 February** **Receipt** by **SMM** of the Symposium paper **prepared of Prof. Badruddin and Dr. M. Jamal Khan** on "Level Borders Irrigation Application Efficiency Under Different Soil Surface **Conditions**".
- 18 February** Follow-up telephone conversation of **SMM** with Dr. **Ahmad** about the Symposium papers **being** prepared by **NARC**.
- 23 February** Receipt by **SMM** of the following draft Symposium **papers** from Mr. **Yasin**:
- \* Innovative **Surface** Irrigation **Methods** for **Orchards**
  - \* Benefits of Supplemental Irrigation for **Wheat** in **Barani** Environment
  - \* Design and Local Manufacturing of Raingun Sprinkler Irrigation **Systems**
  - \* Indigenization of Trickle Irrigation **Technology**

## **PCRWR**

- December Visit of **DTB** to **PCRWR** in **Islamabad** to discuss with **Dr. Munir Bhatti** and his colleagues the **two** Symposium papers on "Encouraging Water **Users** Associations - **Phase II**," and finalize outlines.
- January **Meeting of** **DTB** with **Dr. Bhatti** at the **IIMI-Pakistan office** to work together on the paper on the Qadirabad pre-project socio-economic study, and to review the **draft** on **the** synthesis study. Further discussions on both papers were held with **Dr. Chandio** during the **ISM/R** Biannual Meeting.
- 25 January** Meeting of **SMM** with **Dr. Chandio** on *the* desirability of preparing a **symposium** paper on the "Boundary Effects on **Seepage** Interception

Using the **Galerkin Finite Element Model.**"

- February Review by DTB of the second drafts of the two EWU **papers** and exchange of views with PCRWR **staff**.
- 14 January Joint visit of SMM and **BAS** to the **DRIP campus** in Tando Jam. Met with **Messrs.** Haroon Chang and Muhammad Khan Marri on the preparation of papers for the Symposium and the **progress** of the new pilot tile drainage site in Jacobabad.
- 18 February Follow-up telephone conversation of SMM with Mr. Moulā Bux Mirbahar about the Symposium **papers** being prepared by DRIP.
- 24 February Receipt by SMM of final draft paper on "Potential Role of Water Users Associations for **Better** Water Management at the Farm Level: **Synthesis of** Nine Studies." The draft was passed on to DTB for review.

#### **DHR-Sindh**

- 20 December **Deployment by BAS of 5 Research Officers from the Directorate of Hydrology and Research to report for training at the Irrigation Research Institute (IRI), Punjab, Land Reclamation Directorate (LRD), Punjab, and ACOP-WAPDA.**
- 10 January Meeting of BAS with Dr. Moharnmad Irshad and **Mr.** Karamat Ali, Director, LRD, **Punjab**, to monitor the progress of the training of the officers of the Sindh Hydrology Directorate,
- 12-14 January Joint visit of SMM and **BAS** to the Sindh **Hydrology** Directorate to review the progress of ongoing physical hydraulic modeling studies and the status of the proposed study dealing with collection of hydrological data and **monitoring** of irrigation water in Sindh. Discussed with Messrs. **Shamim-ud-din Ahmed** and Manzoor **Ahmed** Shaikh the 25 January 1993 ISM/R Biannual Meeting in **Lahore**, preparation of **papers** for the April Symposium and submission of final **reports** on the **studies** before the end of **May**. Briefed **them** also on the status of research equipment procurement.
- 25 January Assistance given by BAS to Mr. Ahmed during the latter's presentation in the 2nd ISM/R Biannual Meeting on the **progress of** two **physical** hydraulic modeling studies being **done by the** Directorate.



- 28 January Meeting **of BAS** with Mr. **Abdul Mujib**, Deputy Director, **ACOP-WAPDA**, **to** review the progress of training **of two** Directorate officers.
- 14 February Certificate distribution ceremony attended by **SMM** and **ZH** to mark the formal completion of the training of 5 Directorate officers at **the ACOP-WAPDA** main office.
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### List of Acronyms

<b>BAS</b>	Bagh Ali Shahid
<b>CGR</b>	<b>Carlos</b> Garces-Restrepo
<b>DRIP</b>	Drainage Research Institute of <b>Pakistan</b>
<b>DTB</b>	D. T. Bandaragoda
<b>EJV</b>	<b>Edward</b> J. Vander Velde
<b>EVW</b>	Erik Van Waijjen
<b>JWK</b>	<b>Jacob</b> W. Kijne
<b>LIM</b>	<b>Lower</b> Indus Water Management and Reclamation Research Project
<b>MAB</b>	Muhammad <b>Akhtar</b> Bhatti
<b>MB</b>	M. Badruddin
<b>MK</b>	Marcel Kuper
<b>MN</b>	M. <b>Nadeem</b>
<b>Mona Project</b>	Mona Reclamation Experimental Project
<b>P&amp;I WAPDA</b>	Planning and Investigation, Water and Power Development Authority
<b>PARC</b>	Pakistan Agricultural Research Council
<b>PCRWR</b>	Pakistan Council for Research on Water <b>Resources</b>
<b>PD(S)</b>	Planning Directorate (South)
<b>PS</b>	Pierre Strosser
<b>SID</b>	<b>Sindh</b> Irrigation Department
<b>SMM</b>	Senen M. Miranda
<b>SMO</b>	SCARP Monitoring Organization
<b>WM&amp;ED</b>	Watercourse Monitoring and Evaluation Directorate
<b>ZH</b>	Zaigham Habib

**IRRIGATION SYSTEMS MANAGEMENT RESEARCH (ISM/R)  
SYMPOSIUM**

**11-13 April 1993**  
**Government Engineering Academy Punjab**  
**Niaz Beg, Lahore, Pakistan**

**P R O G R A M**

**10 April (Saturday)**

**Arrival of participants from outside of Lahore and hostel check-in**

**1700**    **Registration**  
**1900**

**11 April (Sunday)**

**Inaugural Session**

**0745**    **Registration**  
**0830**

**0845**    **Guests to be seated**

**0855**    **Arrival of the *Chief Guest*, Mr. Nadir Parvez, Minister of State  
for Water and Power**

**0900**    **Recitation from the *Holy Quran***

**0905**    **Welcome Address by Mr. Khalid Mohtadulhah, Deputy Director  
General, IIMI**

**0910**    **Keynote Address by Mr. Shams ul Mulk, Member (Water),  
WAPDA**

**0920**    **Address by Mr. Arnold J. Radi, Chief, Agriculture and Rural  
Development, USAID**

**0930**    **Inaugural Address by the *Chief Guest***

**0940**    **T E A**  
**1020**

Technical Session I:

**INTEGRATED WATERCOURSE MANAGEMENT**

Chairman: **Mr. Abdullah Khan**  
Rapporteur: **Mr. Erik van Waijjen**

- 1020**    Lessons Learned on Mechanized Construction and Maintenance of Earthen Watercourse  
            **Ghulam Mohy-ud-Din and Mohammad Hanif**
- 1040**    Buried Pipeline irrigation System and Its Impact on the Farm Economy  
            **Zahir Ahmad Piracha, Abdul Ghaffar, Muhammad Rafique Gill, and Muhammad Arif**
- 1100**    Augmentation/Conjunctive Use of Surface and Groundwater Through Fractional Skimming Wells  
            **Mumtaz Ali Buriro and Waryam Ali Mohsin**
- 1120**    Pattern of Flow Variation in Distributaries and Reachwise Supply to Outlets  
            **Bashir Ahmad, Mian Asghar Ali and Akhtar Raza Ahmad Khan**
- 1140**    Procedure for Adjusting Cropping Pattern to Irrigation Supplies  
            **Ghulam Mohy-ud-Din and Muhammad Hanif**
- 1200**    Manually Installed Tile Drainage System - Its Effect and Economics  
            **Zahir Ahmad Piracha, Abdul Ghaffar and Muhammad Rafique Gill**
- 1220**    Discussion  
**1300**
- 1300**            **LUNCH & PRAYERS**  
**1420**

## Technical Session II:

### FARM WATER MANAGEMENT

Chairman: Dr. Jacob W. Kijne  
Rapporteur: Dr. Ramzan Chaudhry

- 1420** Use of Brackish Groundwater for Crop Production  
Abdul Hameed and Muhammad Qaim Channa
- 1440** Water Management Strategies Under Shallow Watertable  
Conditions  
**Muhammad Iqbal**
- 1500** Water Management Strategies for Areas with Poor Drainage or  
Shallow Watertable Conditions Abdul Hameed and Abdul  
Khalique Solangi
- 1520** Discussion  
**1540**

### TEA & ADJOURNMENT

12 April (Monday)

- 0815** Recitation from the Holy Quran

## Technical Session III

### ROLE OF WATER USERS IN IRRIGATION MANAGEMENT

Chairman: Mr. John B. Swanson  
Rapporteur: **Mr. D. T. Bandaragoda**

- 0820** Potential **Role** of Water User Associations for Sustainability of  
Agriculture: Synthesis of Nine Studies  
Bashir Ahrned Chandio, Abdul Majeed, and  
Mohammed Azam
- 0840** Pre-project Socioeconomic Study at Qadirabad and Swat  
Research Sites  
Munir Ahmed Bhatti, Zafar Iqbal Khan and  
Arshad Mahmood
- 0900** Discussion  
**0920**

#### **Technical Session IV:**

##### **DRAINAGE AND WATER TABLE CONTROL**

**Chairman: Mr. Jalil U. Ahmed**

**Rapporteur: Dr. Abdul Majeed**

- 0940 Comparative Effect of Organic, Inorganic and Biological Material on Reclamation of Saline Sodic Soils Under Tile Drainage System**  
**Mohammad Haroon Chang, Moula Bux Mirbahar and Mohammad Khan Marri**
- 1000 Collaborative Tile Drainage System: Key to Solve Waterlogging and Salinity Problems**  
**Moula Bux Mirbahar, Mohammad Khan Marri, and Mohammad Haroon Chang**
- 1020 Effect of Drain Positions and Boundary Conditions on Seepage Interception Using Galerkin Finite Element Model**  
**Bashir A. Chandio, Abdul Samad Chandio and Arshad M. Sheikh**
- 1040 Discussion**  
**1100**
- 1100 T E A**  
**1120**

#### **Technical Session V:**

##### **GROUNDWATER AND PHYSICAL HYDRAULIC MODELING**

**Chairman: Mr. F. A. Zuberi**

**Rapporteur: Dr. Mohammad Nadeem**

- 1120 Estimation of Hydrologic Parameters for Regional Groundwater Models**  
**Javed Zaman**
- 1140 An Appraisal of Groundwater Pollution in Allahabad Unit, SCARP-VI**  
**Javed Zaman**

- 1200      **Interaction of Saline and Fresh Water Zones in Allahabad Unit, SCARP-VI**  
                  Farhat Zaman and Mohammed Nadeem
- 1220      **Physical Modeling of Sediment Ejectors for the Jamrao Canal and Effect of Downstream Glacis Slope on Scour**  
                  Moharnmad Khan Memon and Shamim-ud-din Ahmed
- 1240      **Discussion**  
 1300
- 1300              **L U N C H   &   P R A Y E R S**  
 1420

**Technical Session VI:**

**USE OF DATABASE AND PUBLIC TUBEWELL PERFORMANCE**

**Chairman: Mr. Ishaq Khan Niazi**  
**Rapporteur: Mrs. Zaigham Habib**

- 1420      **Classification of SCARP Tubewells in the Data Base by Their Characteristics and Performance Record**  
                  Parvez Arif
- 1440      **Factors Associated with Deterioration of SCARP Tubewells**  
                  Mohammad Memon and Parvez Arif
- 1500      **Groundwater Quality Changes in Allahabad Unit, SCARP-VI**  
                  Imtiaz Ali, Javed Zaman and Mohammed Nadeem
- 1520      **Evaluation of Mechanical and Air Surging in Wells with Fiberglass Casing**  
                  Mohammad Memon
- 1540      **Discussion**  
 1600

**T E A   &   A D J O U R N M E N T**

13 April (Tuesday)

0815 Recitation from the Holy Quran

**Technical Session VII:**

**IMPROVING ON-FARM WATER USE AND APPLICATION**

Chairman: Mr. Mushtaq Gill  
Rapporteur: Mr. Marcel Kuper

- 0820** Innovative **Surface** irrigation Methods for Orchards  
Muhammad Yasin, Shahid Ahmad, M. Munir Ahmad and  
Asif Ali Bhatti
- 0840** Level Border Irrigation Layout and Evaluation in Pakistan  
Arshad Ati, Badruddin, **M. Jamal** and **Nisar A. Memon**
- 0900** **Level** Borders Irrigation Efficiency Under Different Soil Surface  
Conditions  
Badruddin, M. Jamal Khan and Arshad Iqbal
- 0920** Benefits of Supplemental Irrigation for Wheat in **Barani**  
Environment  
Asif Ali Bhatti, M. Munir Ahmad, **P. M. Moshabbir** and  
Shahid Ahmad
- 0940** Design and Local Manufacturing of Portable **Raingun** Sprinkler  
Irrigation Systems  
Shahid Ahmad, **P. M. Moshabbir**, Asif Ali Bhatti and M.  
Yasin
- 1000 Indigenization of Trickle Irrigation Technology  
**P. M. Moshabbir**, Shahid Ahmad, M. Yasin and M. Munir  
Ahmad
- 1020 Discussion  
**1040**
- 1040 **T E A**  
1100

## Technical Session VIII:

### IRRIGATION SYSTEMS OUTSIDE THE INDUS BASIN

Chairman: Mr. Muhammad Munir

Rapporteur: Dr. Carlos Garces-Restrepo

- 1100** Effect of Karez Improvements and Future Plan of Balochistan  
Ijaz Ahmad Humayun **and** Mushtaq Ahmad
- 1120** Delay-action Dams in Ziarat - An Estimation of Economic Impact  
Muhammad Khalil
- 1140 Advance Irrigation Application Techniques and Their Use in  
Balochistan  
Mushtaq Ahmad
- 1200 Effect of Brackish Water and Phosphorus on Yield of Onion  
Riaz Ahmad
- 1220 Discussion  
1240
- 1240 **LUNCH & PRAYERS**  
1400

## Technical Session IX

### IRRIGATION MANAGEMENT RESEARCH AGENDA OF PAKISTAN FOR THE FUTURE

Chairmen: **Dr. Zafar Altaf**

Mr. Abdul Hafeez Qaiser

Rapporteur: Mr. **M.** Badruddin

- 1400 Research Insights Learned from the **ISM/R** Project  
Senen M. Miranda
- 1415** Irrigation Management Research Agenda: View from PCRWR  
Bashir Ahmed Chandio
- 1430** Irrigation Management Research Agenda: View from WAPDA  
Muhammad Munir
- 1445** Irrigation Management Research Agenda: View from PARC  
Shahid Ahmad



**1500** Irrigation Management Research Agenda: Global View from IIMI  
Jacob W. Kijne

1515 Discussion

1545

### **Closing Session**

**1555** Recitation from the Holy Quran

**1600** Comments by the Project Officer, ISM/R  
Mr. Jalil U. Ahmed

**1615** Comments by the Chairman, CA Planning and Review  
Committee  
Mr. Javed Saleem Qamar

**1630** Symposium Wrap-up  
Dr. Senen M. Miranda

**1645** Vote of Thanks  
Mr. D. T. Bandaragoda, Acting Director, IIMI-Pakistan

**T E A & A D J O U R N M E N T**